

A NEW GENUS *ANTIPODIA* (LEPIDOPTERA: HESPERIIDAE:
TRAPEZITINAE) WITH COMMENTS ON ITS BIOLOGY
AND RELATIONSHIPS

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Abstract

Antipodia gen. n. is proposed to include two Australian HesperIIDae, *Telesto chaostola* Meyrick and *Hesperilla atralba* Tepper. The adults, genitalia and immature stages of these species are figured, and the distribution and biology are given. The closely related *Croitana* Waterhouse and *Proeidoso* Atkins are compared with *Antipodia*, and a key to these genera is presented. The relationship of the new genus to *Hesperilla* Hewitson and *Motasingha* Watson is discussed.

Introduction

Telesto chaostola Meyrick, 1888 was assigned by Waterhouse in 1903 to the genus *Hesperilla* Hewitson, 1868. The characteristics of *Hesperilla* were given by Waterhouse and Lyell (1914) as 'clubs abruptly bent before the middle, and with tips sharply pointed ... Palpi with third joint moderate and porrect'. These authors (1914) also transferred *Hesperilla atralba* Tepper 1882 to the genus *Motasingha* Watson, 1893, and they characterized the genus by 'clubs abruptly bent before the middle and with tips blunt ... Palpi with third joint short and blunt'. In the descriptions of the life history of these two species, Waterhouse (1932a, 1933b) observed that both skippers pupated in a head-downward position within shelters on their foodplant. Other species assigned to *Hesperilla* and *Motasingha* were known to pupate in an upright position.

Hesperilla chaostola and *Motasingha atralba* (here considered congeneric) differ in many important respects from the type species of *Hesperilla*, *H. ornata* (Leach) and the type species of *Motasingha*, *M. dirphia* (Hewitson). They are considered to be more closely related to *Croitana* Waterhouse, 1932a, and *Proeidoso* Atkins, 1973. *Antipodia* and these allied genera are referred to here as the *Proeidoso* group.

The *Proeidoso* group is proposed to contain those genera in which the male genitalia have distally constricted valvae and the sacculus and harpe narrow and curved. The female genitalia have a broad sinus vaginalis, lack a sclerotized lamella antevaginalis, and the corpus bursae lacks or has only a weakly developed accessory pouch. The structure of the larvae and pupae, where known, are midway between *Mesodina* Meyrick and *Hesperilla* Hewitson.

Specimens examined in the following collections are abbreviated thus: AM, Australian Museum; ANIC, Australian National Insect Collection; BMNH, British Museum (Natural History); SAM, South Australian Museum; TM, Tasmanian Museum.

Key to the *Proeidos* group of species

1. Hind tibia with 2 pairs of spurs 2
Hind tibia with 1 pair of spurs *Croitana* Waterhouse
2. Hindwing upperside with central patch of light scales, male forewing with linear sex mark *Antipodia* gen. n.
Hindwing upperside without central patch of light scales, male forewing without sex mark *Proeidos* Atkins

Genus *Antipodia** gen. n.

Type species: *Telesto chaostola* Meyrick, 1888, p. 830.

Diagnosis: *Adult*: labial palpus with second segment very long, hind tibia with two pairs of spurs. Male forewing with sex mark; male genitalia with harpe short and blunt and with a well developed dorsal process. Female genitalia with corpus bursae constricted midway along its length to produce a weakly developed accessory pouch.

Adult: *Head* with antenna (Figs 7, 22) $\frac{1}{2}$, or slightly more than $\frac{1}{2}$, length of costa, club medium to broad, bent moderately before middle, apiculus slightly tapered to blunt, nudum 16–19, shaft with light segmental bands. Labial palpus (Figs 6, 21) with second segment long and slender and extending beyond frons, third segment correct, moderately long and blunt.

Wings (Figs 1–5, 16–20) forewing with inner margin longer than termen, costa either concave or convex but not straight, 1A+2A bowed strongly between median and postmedian areas, origin of CuA₂ and CuA₁ distally placed $\frac{2}{3}$ and $\frac{4}{5}$ along cubitus, Sc reaching costa approximate to end of cell, areas of pale scales in apical area between R₃, R₄, R₅, and M₁, in postmedian area of cell, between M₃ and CuA₁ (sometimes in males between CuA₁ and CuA₂), and in subterminal areas between M₁, M₂, and M₃; male forewing with sex mark; female with additional pale spots on forewing in median–postmedian areas between CuA₁, CuA₂, a 1A+2A; underside of both sexes as for upperside but

*Feminine; the generic name refers to the species' unique 'up-side-down' method of pupation, and their endemic Australian distribution.



Figs 1-15. Adult and early stages of *Antipodia chaostola* (Meyrick) from Victoria: (1) male upper-side; (2) female upper-side; (3) male underside; (4) female underside; (5) male wing venation; (6) labial palpus; (7) antennal club; (8) and (9) egg; (10) and (11) final instar larva; (12) and (13) pupa; (14) frons of final instar larval head; (15) head of pupa. Scale lines: Figs 1-5, 10-15 = 10 mm; Figs 6-9 = 1 mm.

with grey scales covering apical and terminal areas. Hindwing with costa longer than inner margin, cubitus between CuA_1 and M_3 angled towards disocellulars; upperside with pale yellow to orange scales at distal edge of cell and in subterminal and terminal sector between M_1 , M_2 , and M_3 ; long pale scales from base to tornal area; underside grey with series of darker mottling in subbasal and submedian areas, and series of dark markings arranged in rings in subterminal area approximately parallel to termen.

Hind tibia with two pairs of spurs.

Male genitalia (Figs 31, 34) with combined tegumen and uncus shorter than valva, distally blunt with short lateral lobes; gnathos well developed, extending ventrally and posteriorly, divided distally by two heavily sclerotized ridges; valva broad, curved dorsally and constricted posteriorly to short sclerotized process, harpe moderately broad and short, curved dorsally, a long curving sclerotized process along inner edge; saccus well developed; aedeagus long, broadened posteriorly.

Female genitalia (Figs 32, 33) papilla analis long, concave; sclerotized lobes covered with long setae; broad, bifid, distally placed sterigma plates, slightly concave and centrally depressed; caudal chamber of sinus vaginalis very broad, without extended sclerotized lamella antevaginalis plate; corpus bursae broad, ovoid, elongate, and slightly constricted distally toward weakly developed accessory pouch.

Antipodia chaostola (Meyrick)

(Figs 1–15)

Antipodia chaostola chaostola (Meyrick) **comb. n.**

Telesto chaostola Meyrick, 1888, p. 830; Miskin 1891, p. 80; Meyrick & Lower 1902, p. 65.

Hesperilla chaostola (Meyrick); Waterhouse 1903, p. 42; Lower 1911, p. 132; Waterhouse & Lyell 1914, p. 187, figs 690, 691, 700; Seitz 1927, p. 1057;

Hesperilla chaostola chaostola (Meyrick); Waterhouse 1932a, p. 200; Waterhouse 1932b, p. 239, pl. 32 Waterhouse, 1933a, p. 54; Waterhouse 1933b, p. 462; Evans 1949, pp. 219–20, genit. pl. 27; Common 1964, p. 22, figs 63, 64; McCubbin 1971, p. 166; Common & Waterhouse 1972, p. 119; Common & Waterhouse 1981, p. 167.

Type. NEW SOUTH WALES: *Holotype* ♂ labelled 'Blackheath, 1814' in BMNH examined by author.

Distribution. NEW SOUTH WALES: Blue Mountains (Katoomba to Lithgow, above 1000 m).

Foodplant. *Gahnia filifolia* Kuek. (Cyperaceae).

Antipodia chaostola chares (Waterhouse) comb. n.

Hesperilla chaostola chares Waterhouse, 1933b: p. 462; Evans 1949: p. 220; Common 1964: p. 22; McCubbin 1971: p. 166, fig. 4; Common & Waterhouse 1972: p. 119, pl. 7, fig. 1; Common & Waterhouse 1981: p. 166, pl. 4, fig. 1, larva pl. 3, fig. 6.

Types. VICTORIA: *Holotype* ♂, *Allotype* ♀, seven *paratype* ♂♂ and two *paratype* ♀♀ all labelled 'Beaconsfield, Vic.' in AM examined by author.

Distribution. VICTORIA: central to western Victoria from Moondarra to Victoria Valley.

Foodplant. *Gahnia radula* (R. Br.) Benth., *G. sieberana* Kunth, *G. microstachya* Benth. and *G. grandis* (Labill.) S.T. Blake.

Antipodia chaostola leucophaea (Couchman) comb. n.

Hesperilla chaostola leucophaea Couchman, 1946: p. 51; Evans 1949: p. 220; Common 1964: p. 22; McCubbin 1971: p. 166; Common & Waterhouse 1972: p. 120; Couchman & Couchman 1978: p. 70, pl.; Common & Waterhouse 1981: p. 167.

Types. TASMANIA: *Holotype* ♂ labelled 'Kingston, Tas. 5th Nov. 1945. J.R. Cunningham' in TM; *Allotype* ♀ labelled with same data in TM; four *paratype* ♂♂ labelled 'Kingston, Tasm. 10.xi.45. L.E. Couchman' and 'Hobart, Tasm. 7.xi.42. L.E. Couchman' in L.E. Couchman collection; three *paratype* ♀♀ labelled 'Kingston, Tasm. 10.xi.45. L.E. Couchman' in L.E. Couchman collection; one *paratype* ♂ labelled 'Kingston, Tasm. 10.xi.45. L.E. Couchman' in AM. These specimens not examined by author.

Distribution. TASMANIA: Eastern coast (Hobart, Kingston, Huonville, Bicheno).

Foodplant. *Gahnia radula* (R. Br.) Benth.

Biology

This is a temperate climate species found in habitats below the winter snow-fall zones of the Dividing Range in eastern Australia at altitudes of 400–1000 m, and also near sea-level in Victoria and Tasmania. This species is generally very scarce and local, seemingly dependent on very specialized habitats near sheltered headwaters and marshlands within stringy-bark and peppermint dry sclerophyll woodlands and sandy heaths. The adults are rarely observed and fly during a few weeks in October, November and early December. They visit flowering herbs or rest close to the ground. Males have occasionally been observed flying near ridge-tops. Females appear to favour small young plants or regrowth following bushfires for oviposition. The

illustration of an egg (Figs 8, 9) was reconstructed from a hatched egg that I found in the Grampian Mountains, western Victoria. This egg was on the underside of a *Gahnia* leaf near a larval shelter of this species. Five other species of skippers whose larvae feed on *Gahnia* spp. occur in this area but none have eggs with the combined characters of large size, smooth shell and oval shape.

Young larvae are easily recognized by their pale, striped head, bright red prothorax and their habit of resting head-downwards in shelters made from tightly bound leaf tips. Mature larvae construct strong conical or 'tent-like' shelters near the base of the plant. Pupation occurs in a head-downward position within these shelters. The unusual life cycle, occupying two years, was described by Waterhouse (1933b) and by Common and Waterhouse (1972, 1981).

Comments

This species is easily distinguished from *A. atralba* by its orange-brown colour and differs from hesperilline and trapezitine skippers by the presence of scattered orange hindwing maculation and in behaviour by a more open-winged pose when resting in sunshine. The underside of the apical area of the forewing and of the hindwing is distinctively silver-grey, tinged purple.

In Victoria I have collected both pupae and young larvae in spring in consecutive years, indicating that *A. chaostola* flies each year. No constant differences between specimens in odd and even years have been discerned. The species is rare and much of its habitat has been cleared.

Antipodia atralba (Tepper)

(Figs 16–30)

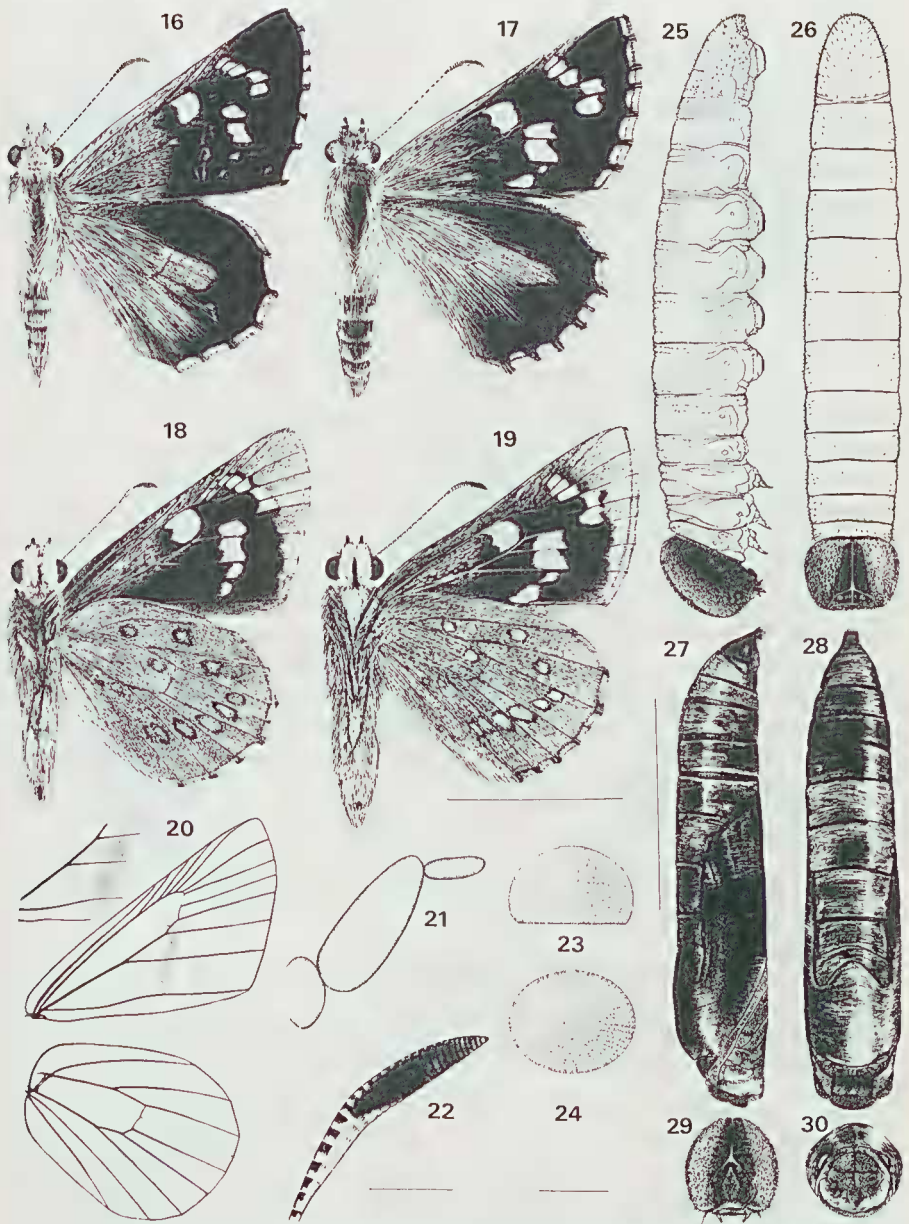
Antipodia atralba atralba (Tepper) **comb. n.**

Hesperilla atralba Tepper, 1882: p. 33, pl. 2; Miskin 1891: p. 81; Lower 1893: p. 13; Waterhouse 1903: p. 43; Lower 1911: p. 132.

Telesto atralba (Tepper) Meyrick & Lower 1902: p. 71.

Motasingha atralba (Tepper) Waterhouse & Lyell 1914: p. 195, fig. 649; Seitz 1927: p. 1056; Waterhouse 1932a: p. 200; Waterhouse 1932b: p. 233, fig. 17; Waterhouse 1932c: p. 223; Waterhouse 1933a: p. 57; Waterhouse 1937a: p. 33; Waterhouse 1937b: p. 119; Evans 1949: p. 223, pl. 28; Common 1964: p. 26, fig. 84; McCubbin 1971: p. 168, fig. 3; Common & Waterhouse 1972: p. 129, pl. 5, fig. 17; Fisher, 1978: p. 103; Common & Waterhouse 1981: p. 179, pl. 3, fig. 17.

Type. NEW SOUTH WALES: *Lectotype* ♀ labelled 'Adrossan' in SAM (examined by the author). Tepper did not designate a holotype, nor did he indicate the number of specimens that he based the species on. Waterhouse and Lyell (1914) indicate that the 'type' came from Ardrossan. This is here taken as a valid designation of a lectotype of



Figs 16-30. Adult and early stages of *Antipodia atralba* (Tepper) from South Australia: (16) male upperside; (17) female upperside; (18) male underside; (19) female underside; (20) male wing venation [inset, sex mark of male from Western Australia]; (21) labial palpus; (22) antennal club; (23) and (24) egg; (25) and (26) final instar larva; (27) and (28) pupa; (29) frons of final instar larval head; (30) head of pupa. Scale lines: Figs 16-20, 25-30 = 10 mm; Figs 21-24 = 1 mm.

the specimen so labelled in the South Australian Museum. The specimen consists of two forewings.

Distribution. VICTORIA: Hattah Lakes, Big Desert. SOUTH AUSTRALIA: Murray Mallee, Upper South-East, southern Mount Lofty Ranges, Port Noarlunga, Moonta, Ardrossan, Point Pierce, Ceduna (Common and Waterhouse 1981, Fisher 1978, Atkins unpublished records).

Foodplant. *Gahnia lanigera* (R. Br.) Benth. and *Gahnia ancistrophylla* (F. v. M.) Benth. (Cyperaceae).

***Antipodia atralba dactyliota* (Meyrick) comb. n.**

Telesto atralba dactyliota Meyrick, 1888: p. 831.

Hesperilla atralba dactyliota (Meyrick), Miskin 1891: p. 81; Lower 1893: p. 13.

Motasingha atralba dactyliota (Meyrick), Waterhouse & Lyell 1914: p. 196, figs 648*, 773*; Seitz 1927: p. 1056; Waterhouse 1932b: p. 234, fig. 18*; Waterhouse 1932c: p. 224; Waterhouse 1933a: p. 57; Waterhouse 1937a: p. 33; Waterhouse 1937b: p. 119; Evans 1949: p. 224; Common 1964: p. 26; McCubbin 1971: p. 168; Common & Waterhouse 1972: p. 130; Common & Waterhouse 1981: p. 181.

Type. WESTERN AUSTRALIA: *Lectotype* ♂ labelled 'Geraldton' in BMNH (examined by the author). Subspecies *dactyliota* was described by Meyrick from two males and a female from Geraldton and a female from Port Lincoln (Waterhouse 1937a). Waterhouse (1937b) states 'holotype male from Geraldton in Meyrick's collection'. This specimen cannot be regarded as a holotype, but is here regarded as a valid designation of a lectotype.

Distribution. WESTERN AUSTRALIA: Geraldton area.

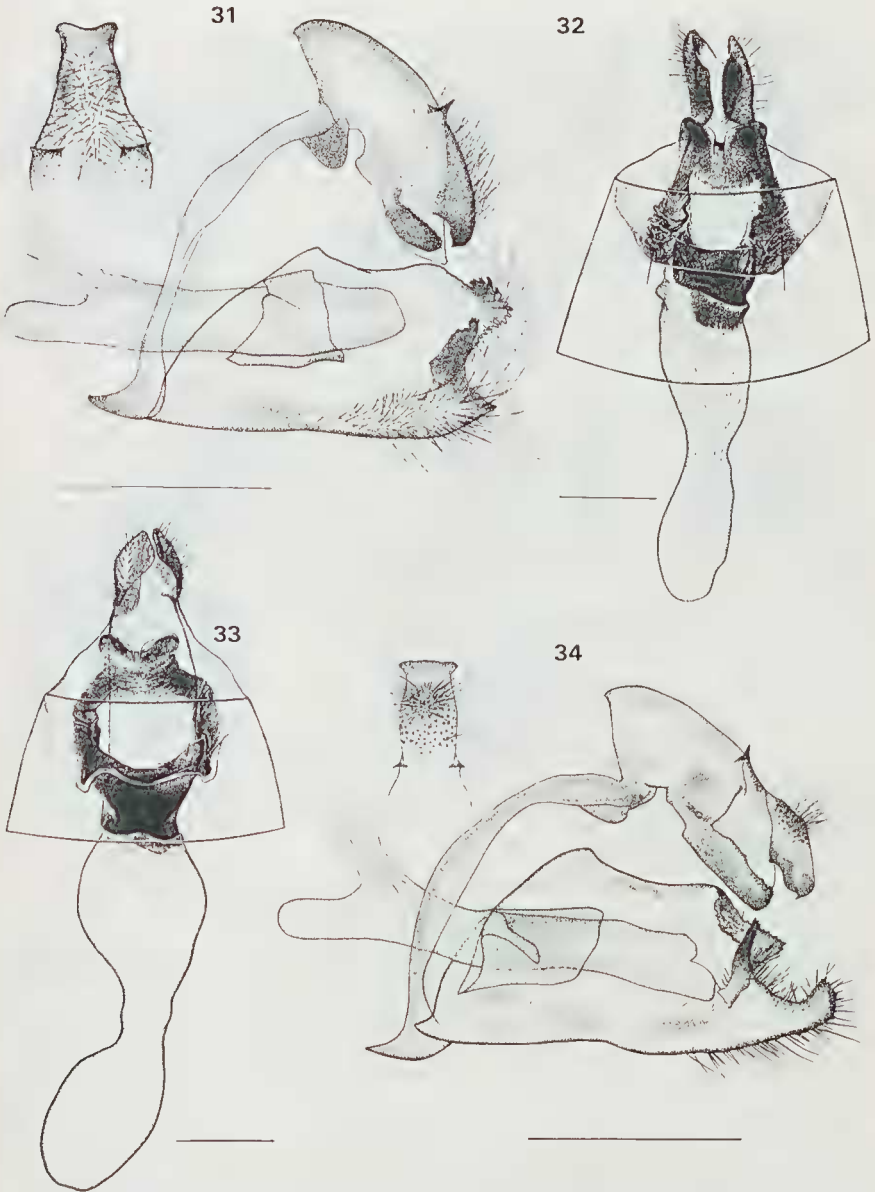
Foodplant. *Gahnia lanigera* (R. Br.) Benth. (Cyperaceae) (R. Grund, personal communication).

***Antipodia atralba nila* (Waterhouse) comb. n.**

Motasingha atralba nila Waterhouse, 1932c: p. 224; Waterhouse 1937a: p. 33; Waterhouse 1937b: p. 119; Evans 1949: p. 224; Common 1964: p. 26; McCubbin 1971: p. 168; Common & Waterhouse 1972: p. 130; Common & Waterhouse 1981: p. 181.

Type. WESTERN AUSTRALIA: *Lectotype* ♂ labelled 'Dirk Hartog Is., W.A.' in AM (examined by the author). Subspecies *nila* was described by Waterhouse (1932c) from a series of specimens and although 'types' was mentioned, no single specimen was indicated in the original description. However, in 1937b, he stated 'holotype male

*These figures are considered to be subspecies *anaces*.



Figs 31-34. Genitalia of *Antipodia* spp.: (31) male *A. chaostola* lateral view [inset, uncus dorsal view]; (32) female *A. chaostola* ventral view; (33) female *A. atralba* ventral view; (34) male *A. atralba* lateral view [inset, uncus dorsal view]. Scale lines = 1 mm.

from Dirk Hartog Is. at Sydney'. The specimen labelled holotype in the Waterhouse collection is here regarded as the lectotype and was designated by Waterhouse (1937b).

Distribution. WESTERN AUSTRALIA: Dirk Hartog Island.

Foodplant. Unrecorded.

***Antipodia atralba anaces* (Waterhouse) comb. n.**

Motasingha atralba anaces Waterhouse, 1937a: p. 33; Waterhouse 1937b: p. 119; Evans 1949: p. 224; Common 1964: p. 26; McCubbin 1971: p. 168; Common & Waterhouse 1972: p. 130, pl. 5, fig. 18; Common & Waterhouse 1981: p. 180, pl. 3, fig. 18.

Type. WESTERN AUSTRALIA: *Lectotype* ♂ labelled 'Hamel, W.A.' in AM (examined by the author). Subspecies *anaces* was described by Waterhouse (1937a) from a series of specimens, but no single specimen was indicated as the type in the original description. In Waterhouse (1937b), however, he states that the holotype male from Hamel is at the Sydney Museum. This specimen cannot be regarded as a holotype, but is regarded as a valid designation of a lectotype.

Distribution. WESTERN AUSTRALIA: south from Perth, including National Park, Lesmurdie, Waroona, Hamel.

Foodplant. Unrecorded.

***Antipodia atralba anapus* (Waterhouse) comb. n.**

Motasingha atralba anapus Waterhouse 1937a: p. 33; Waterhouse 1937b: p. 119; Evans 1949: p. 224; Common 1964: p. 26; McCubbin 1971: p. 168; Common & Waterhouse 1972: p. 130; Common & Waterhouse 1981: p. 180.

Type. WESTERN AUSTRALIA: *Holotype* ♂, two *paratype* ♀♀ labelled 'Stirling Ranges, W.A.' in AM.

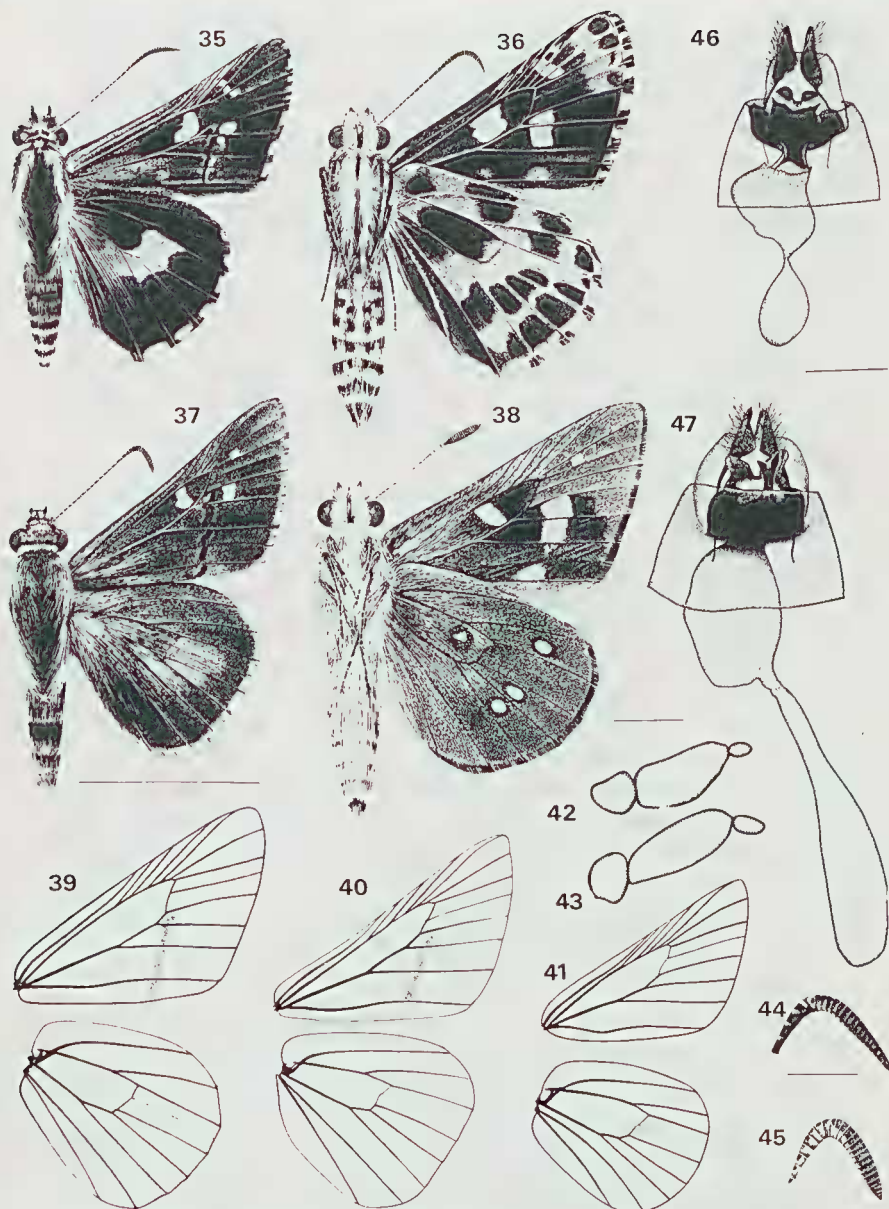
Distribution. WESTERN AUSTRALIA: Cocklebidy to Stirling Range and southern coast.

Foodplant. *Gahnia lanigera* (R. Br.) Benth. (Cyperaceae).

Biology

The habitats of *Antipodia atralba* include mallee woodland, sub-desert heath, coastal dunes and dry sclerophyll forests. Where known, the larvae of *A. atralba* feed on *Gahnia lanigera*, but *G. anistrophylla* has been recorded as an alternative foodplant.

The eggs are laid singly on the involuted leaf-blades of the foodplant and the larvae make twisted conical shelters from several



Figs 35-47. Adult Trapezitinae: (35) male *Hesperilla ornata* upperside; (36) female *H. ornata* underside; (37) male *Motosingha dirphia* upperside; (38) female *M. dirphia* underside; (39) male *Hesperilla donnysa* wing venation; (40) male *M. dirphia* wing venation; (41) male *Croitana croites* wing venation; (42) *H. ornata* labial palpus; (43) *M. dirphia* labial palpus; (44) *H. ornata* antennal club; (45) *M. dirphia* antennal club; (46) female *H. ornata* genitalia; (47) female *M. dirphia* genitalia. Scale lines: Figs 35-41 = 10 mm; Figs 42-47 = 1 mm.

leaves bound together with silk. The larvae and pupae are found within the shelters in a head-downward position. The rate of development of the larvae is variable and the life cycle may last from three to twelve months (Common and Waterhouse 1981).

The adult skippers are locally common and fly usually in spring and autumn. Their flight is moderately fast and close to the ground. Both sexes frequently visit flowers in bright sunshine and males occupy 'territories' where they rest on sand and leaf litter in smaller clearings or on low ridges and dunes.

The subspecies from Western Australia are small and dull, and the males have a broad, wedge-shaped sex mark that extends between CuA_1 and the inner margin of the forewing (inset, Fig. 20). Their early stages and adult morphology closely resemble those of the typical subspecies from South Australia and the small, bright subspecies from western Victoria.

Discussion

The species assigned to *Antipodia* cannot be distinguished by the larval and pupal characters to trapezitine, mesodine or hesperilline groups as proposed by Waterhouse (1932b). The typical hesperilline genera, *Hesperilla* and *Motasingha* are characterized by their elongate, semi-transparent larvae and long cylindrical pupae in which the pupal caps are strongly protruding and heavily sclerotized. The abdominal segments are covered with stiff bristles, apparently an adaption to support the pupae in an upright position within the foodplant shelter. In contrast, the larvae of *Antipodia* (Figs 10, 11, 25, 26) are tapered posteriorly and covered with setae; the pupae are also tapered posteriorly and lack stiff abdominal bristles. The pupal caps are rounded and only lightly sclerotized and both larvae and pupae are found inverted, head downwards, in twisted cone-shaped shelters.

Adult *A. chaostola* and *A. atralba* differ from species in the genera *Hesperilla* and *Motasingha* by the following combination of characters: antennal club moderately short and blunt (Figs 7, 22, 44, 45); third segment of labial palpus long (Figs 6, 21, 42, 43); subterminal spots present on forewing, males with sex mark restricted between CuA_1 and the inner margin of the forewing (Figs 5, 20, 39, 40); male genitalia (Figs 31, 34) with valvae distally constricted; female genitalia (Figs 32, 33, 46, 47) with accessory pouch to the corpus bursae weakly developed and lamella antevaginalis absent.

The genus *Motasingha* is apparently closely allied to *Hesperilla*. The male sex mark (Fig. 40) and male and female genitalia (Fig. 47)

of *Motasingha dirphia* (Hewitson) are comparable to those of *Hesperilla donnyisa* Hewitson, *Hesperilla flavescens* Waterhouse, *Hesperilla idothea* (Miskin), and *Hesperilla mastersi* Waterhouse, but the antennal club is unusually constricted and blunt (Fig. 45).

The morphology of *Antipodia* is similar to *Proeidosia* and *Croitana* (see Atkins 1973 and Edwards 1979) with characters somewhat midway between *Hesperilla* and *Mesodina* Meyrick. *Antipodia* differs from *Croitana* by an evenly curved and more pointed antennal club, the presence of a medium pair of spurs on the hind tibia, a sex mark on the male forewing and by details of the wing venation (Fig. 41). The egg of *Croitana croites* (Hewitson) was described by Common and Waterhouse (1981) and the first instar larva is similar to that of *Proeidosia* (unpublished observation) but other life history details are unknown. *Antipodia* differs from *Proeidosia* by the longer labial palpus and by the presence of a sex mark on the forewing of the male. Both sexes have patches of pale coloured scales on the upperside of the hindwing and the larval foodplant of *Antipodia* is *Gahnia*. The life history of *Proeidosia* is similar to that of *Antipodia* but the egg has 22–23 well defined vertical ribs and the larval foodplant is *Triodia* (Family Poaceae).

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References

- Atkins, A.F., 1973. A new genus *Proeidosia* for an Australian skipper, *Pasma polysema* (Lower) (Lepidoptera: Hesperiiidae, Trapezitinae). *J. Aust. ent. Soc.* 12: 253–260.
- Common, I.F.B., 1964. *Australian Butterflies*. Jacaranda Press, Brisbane.
- Common, I.F.B. and Waterhouse, D.F., 1972. *Butterflies of Australia*. Angus and Robertson, Sydney.
- Common, I.F.B. and Waterhouse, D.F., 1981. *Butterflies of Australia*. Revised edition. Angus and Robertson, Sydney.
- Couchman, L.E., 1946. Notes on the Lepidoptera–Rhopalocera of Tasmania. *Pap. Proc. R. Soc. Tasm.* 1945: 49–53.

- Couchman, L.E., and Couchman, R., 1978. The butterflies of Tasmania. In: *Tasmanian Year Book* No. 11, 1977. Pp. 66-96, 6 pls.
- Edwards, E.D., 1979. Two new species of *Croitana* Waterhouse (Lepidoptera: Hesperiiidae) from central Australia. *Aust. ent. Mag.* 6(2): 29-38.
- Evans, W.H., 1949. *A catalogue of the Hesperiiidae from Europe, Asia and Australia in the British Museum (Natural History)*. British Museum (Natural History), London.
- Fisher, R.H., 1978. *Butterflies of South Australia (Lepidoptera : Hesperioidea, Papilionoidea)*. Woolman, Govt Printer, South Australia.
- Hewitson, W.C., 1868. *Descriptions of one hundred new species of Hesperidae* Part II, pp. 25-56. John van Voorst, London.
- Lower, O.B., 1893. List of South Australian Rhopalocera. *Trans. R. Soc. S. Aust.* 17(1): 1-12.
- Lower, O.B., 1911. Revision of the Australian Hesperiiidae. *Trans. R. Soc. S. Aust.* 35: 112-172.
- McCubbin, C.W., 1971. *Australian Butterflies*. Nelson, Melbourne.
- Meyrick, E., 1888. Description of new Australian Rhopalocera. *Proc. Linn. Soc. N.S.W.* (2)2(4): 827-834.
- Meyrick, E. and Lower, O.B., 1902. Revision of the Australian Hesperidae. *Trans. R. Soc. S. Aust.* 26(2): 38-129.
- Miskin, W.H., 1891. A synonymical catalogue of the Lepidoptera Rhopalocera (butterflies) of Australia with full bibliographical reference: including descriptions of some new species. *Ann. Qd Mus.* 1: i-xx; 1-93; i-ix.
- Seitz, A., 1927. *The Macrolepidoptera of the world*. Vol. 9: 1057-1064. (The Indo-Australian Rhopalocera). Alfred Kernen, Stuttgart.
- Tepper, J.G.O., 1882. The Papilionidae of South Australia. *Trans. Proc. Rep. R. Soc. S. Aust.* 4: 25-36.
- Waterhouse, G.A., 1900. Descriptions of new species of Australian Rhopalocera. *Proc. Linn. Soc. N.S.W.* 25(1): 52-57.
- Waterhouse, G.A., 1903. A catalogue of the Rhopalocera of Australia. *Mem. N.S.W. Nat. Club* 1: 1-49.
- Waterhouse, G.A., 1927. Australian Hesperiiidae. Part I. Notes and descriptions of new forms. *Proc. Linn. Soc. N.S.W.* 52(3): 275-283.
- Waterhouse, G.A., 1932a. New genera of Australian Hesperiiidae and a new subspecies. *Aust. Zool.* 7(3): 198-201.
- Waterhouse, G.A., 1932b. *What butterfly is that?*. Angus and Robertson, Sydney.
- Waterhouse, G.A., 1932c. Australian Hesperiiidae. II. Notes and descriptions of new forms. *Proc. Linn. Soc. N.S.W.* 57(3-4): 218-238.
- Waterhouse, G.A., 1933a. Notes on the type specimens of Hesperiiidae (Lepidoptera) in the museums in Australia, with special reference to those in the South Australian Museum. *Rec. S. Aust. Mus.* 5(1): 49-62.
- Waterhouse, G.A., 1933b. Australian Hesperiiidae. IV. Notes and descriptions of new forms. *Proc. Linn. Soc. N.S.W.* 58(5-6): 461-466.
- Waterhouse, G.A., 1937a. Australian Hesperiiidae VI. Descriptions of new subspecies. *Proc. Linn. Soc. N.S.W.* 62(1-2): 32-34.
- Waterhouse, G.A., 1937b. Australian Hesperiiidae. VII. Notes on the types and type localities. *Proc. Linn. Soc. N.S.W.* 62(3-4): 107-125.
- Waterhouse, G.A. and Lyell, G., 1914. *The butterflies of Australia. A monograph of Australian Rhopalocera*. Angus and Robertson, Sydney.
- Watson, E.Y., 1893. A proposed classification of the Hesperiiidae, with a revision of the genera. *Proc. zool. Soc. Lond.* 1893(1): 3-132, pls I-III.